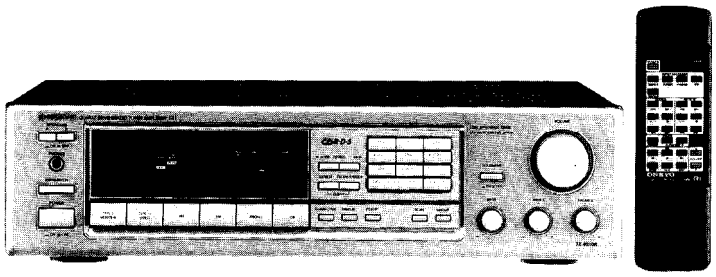
Ref. No. 3443

ONKYO SERVICE MANUAL

QUARTZ SYNTHESIZED TUNER AMPLIFIER
MODEL TX-8210
MODEL TX-8210R



Black and Silver models

BMD, BMDN	120V AC, 60Hz
BMP, SMP	230V AC, 50Hz
BMW	120V or 220V AC, 50/60Hz

SAFETY-RELATED COMPONENT WARNING!!
COMPONENTS IDENTIFIED BY MARK ⚠ ON THE SCHEMATIC DIAGRAM AND IN THE PARTS LIST ARE CRITICAL FOR RISK OF FIRE AND ELECTRIC SHOCK. REPLACE THESE COMPONENTS WITH ONKYO PARTS WHOSE PART NUMBERS APPEAR AS SHOWN IN THIS MANUAL.

MAKE LEAKAGE-CURRENT OR RESISTANCE MEASUREMENTS TO DETERMINE THAT EXPOSED PARTS ARE ACCEPTABLY INSULATED FROM THE SUPPLY CIRCUIT BEFORE RETURNING THE APPLIANCE TO THE CUSTOMER.

TABLE OF CONTENTS

Specifications 2
Service procedures 3
Exploded view 4
Parts list 5
Block diagrams 6
Microprocessor-connection diagram 8
Microprocessor terminal descriptions 9
IC block diagrams and descriptions 10
Adjustment procedures 14
Pc board view from soldering side 17
Schematic diagram 19
Pc board view from soldering side 23
Printed circuit board-parts list 25
Packing view 28

ONKYO AUDIO COMPONENTS

SPECIFICATIONS

AMPLIFIER SECTION

Power Output: **48 watts per channel min. RMS. at 8 ohms, both channels driven, from 40 Hz to 20,000 Hz, with no more than 0.3% total harmonic distortion.**

Dynamic power output:
- 2 × 105 watts at 3 ohms
- 2 × 80 watts at 4 ohms
- 2 × 60 watts at 8 ohms

Continuous power output:
- 2 × 60 watts at 4 ohms 1 kHz (DIN)
- 2 × 50 watts at 8 ohms 1 kHz (DIN)

Total Harmonic Distortion: 0.3 % at rated power
0.1 % at 30 watts output

IM Distortion (FRONT): 0.3% at rated power
0.1 % at 30 watts output

Damping Factor (FRONT): 50 at 8 ohms

Input sensitivities and impedance:

Phono:	2.5 mV/50 kohms
CD/Tape play:	150 mV/50 kohms

Output level and impedance:

Tape rec:	150 mV/3.5 kohms

Phono Overload: 120 mV RMS. at 1,000 Hz, 0.2% THD.
Frequency Response: 20 to 30,000 Hz, +/–1 dB
RIAA Deviation: 20 to 20,000 Hz, +/–0.8 dB
Tone Control: BASS: +/–10 dB at 100 Hz
TREBLE: +/–10 dB at 10,000 Hz
Signal to Noise Ratio: PHONO: 80 dB (IHF A, 5 mV input)
CD/TAPE: 100 dB (IHF A)
Muting: – ∞ dB

TUNER SECTION

FM:

Tuning Range: European and worldwide models:
87.50 — 108.00 MHz (50 kHz steps)
U.S.A. and Canadian models:
87.50 — 108.00 MHz (100 kHz steps)

Usable Sensitivity: Mono: 12.4 dBf, 1.2 µV (75 ohms IHF)
1.2 µV (75 ohm DIN)
Stereo: 19.2 dBf, 2.5 µV (75 ohms IHF)
25 µV (75 ohm DIN)

50dB Quieting Sensitivity: Mono: 18.2 dBf, 2.2 µV (75 ohms)
Stereo: 38.2 dBf, 22.0 µV (75 ohms)

Capture Ratio: 1.5 dB
Image Rejection Ratio: U.S.A. & Canadian models: 40 dB
Other area models: 85 dB
IF Rejection Ratio: 90 dB
Signal-to-Noise Ratio: Mono: 70 dB, IHF
Stereo: 65 dB, IHF

Alternate Channel Attenuation (+/– 400 kHz): Mono 55 dB, IHF
Selectivity: 50 dB DIN (+/–300 kHz 40 kHz Devi.)
AM Suppression Ratio: 50 dB
Total Harmonic Distortion: Mono: 0.15%
Stereo: 0.30%
Frequency Response: 30 — 15,000 Hz +/–1.5 dB
Stereo Separation: 40 dB at 1,000 Hz/30 dB at 100 — 10,000 Hz
Muting Level: 17.2 dBf, 2.0 µV (75 ohms)

AM:

Tuning Range: European models
522 — 1,611 kHz (9 kHz steps)
U.S.A. & Canadian models
530 — 1,710 kHz (10 kHz steps)
Worldwide models
531 — 1,602 kHz (9 kHz steps)
530 — 1,710 kHz (10 kHz steps)

Usable Sensitivity: 30 µV
Image Rejection Ratio: 40 dB
IF Rejection Ratio: 40 dB
Signal-to-Noise Ratio: 40 dB
Total Harmonic Distortion: 0.8%

GENERAL

Power Supply (TX-8210): U.S.A. & Canadian models
AC120 V, 60 Hz
Worldwide models
120 and 220 V switchable, 50/60 Hz
(TX-8210R): European models:
AC230 V, 50 Hz

Dimensions (W × H × D): 455 × 120 × 316 mm
17-15/16" × 4-3/4" × 12-7/16"
Mass: 7.0 kg (15.4 lbs)

Specifications and features are subject to change without notice.

SERVICE PROCEDURES

1. Replacing the fuses

This symbol located near the fuse indicates that the fuse used is fast operating type. For continued protection against fire hazard, replace with same type fuse. For fuse rating refer to the marking adjacent to the symbol.

Ce symbole indique que le fusible utlise est a rapide. Pour une protection permanente, n'utiliser que des fusibles de meme type. Ce darnier est indique la qu le present symbol est appose.

CIRCUIT NO.	PART NO.	DESCRIPTION
F901	252163Y	4A-UL/T-237, Primary 〈D/W〉
F902	252073	1.6A-SE-EAK, Primary 〈P/W〉
F903	252073	1.6A-SE-EAK, Primary 〈P〉

NOTE: <D> :120V model only
<P> :230V model only
<W>:Worldwide model only

2. To Initialize the unit

This device employs a microprocessor to perform various functions and operations. If interference generated by an external power supply, radio wave, or other electrical source results in accident which causes the specified operations and functions to operate abnormally.

To perform a result, please follow the procedure below.

1. Push STAND-BY button while pressing down CD button, then pull the power cord off within 5 seconds of the display "TEST-" on FL Tube. By this procedure, "CLEAR" will be displayed and all memories will be initialized.

3. Safety-check out

(Only U.S.A. model)

After correcting the original service problem, perform the following safety check before releasing the set to the customer. Connect the insulating-resistance tester between the plug of power supply cord and the screw on the back panel.

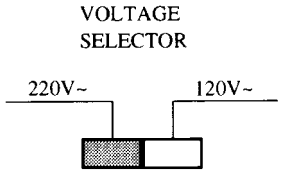
Specifications: 3.3 Mohm±10% at 500V.

4. Change of voltage

Worldwide models are equipment with a voltage selector to conform with local power supplies. This switch is located on the back panel.

Be sure to set this switch to match the voltage of the power supply in your area before turning the power switch on.

This switch is set to 220V at the factory. Voltage is changed by sliding the groove in the switch with the screwdriver to the right or left. Confirm that the switch has been moved all the way to the right or left before turning the power switch on.



5. Memory preservation

This unit does not require memory preservation batteries.

A built-in memory power back-up system preserves contents of the memory during power failures and even when the unit is unplugged.

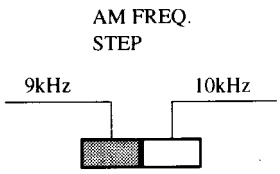
The unit must be plugged in and the power switch turned on and off once in order to charge the back-up system. Note that since this is not a permanent memory, the power switch must be turned on and off a few times each month the keep the back-up system operative.

The period of the time during which memory contents are preserved after power has last been turned off varies depending on climate and placement of the unit. On the average, memory contents are protected over a period of 3 to 4 weeks (a minimum of 2 weeks) after the last time power has been turned off. This period is shorted when the unit is exposed to very high humidity or used in an area with an extremely humid climate.

6. Setting the tuning step frequency

Worldwide models are equipped with a step band selector switch. This switch is located on the back panel. This switch is set to 9 kHz at the factory, but may have to be reset to 10 kHz depending on the area where the unit is used.

	AM band step
Europe:	9 kHz
U.S.A.:	10 kHz

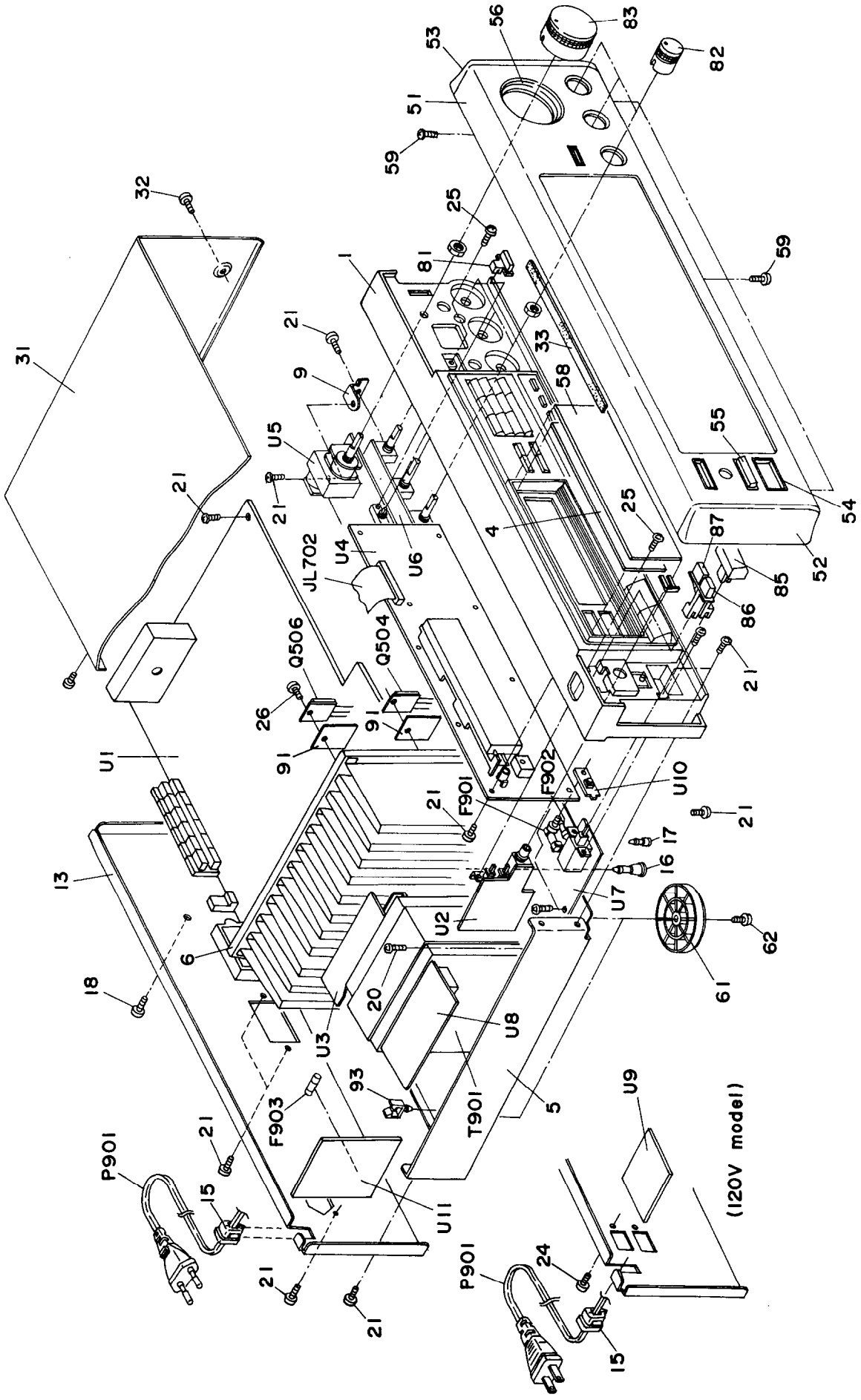


7. Changing the band step

With the exception of the worldwide models, a tuning step selector switch is not provided. When you change the band step, change the parts as shown below.

FM	To 100kHz	To 50kHz
AM	To 10kHz	To 9kHz
R705	3kohm	Open
R706	Open	47kohm

EXPLODED VIEW



PARTS LIST

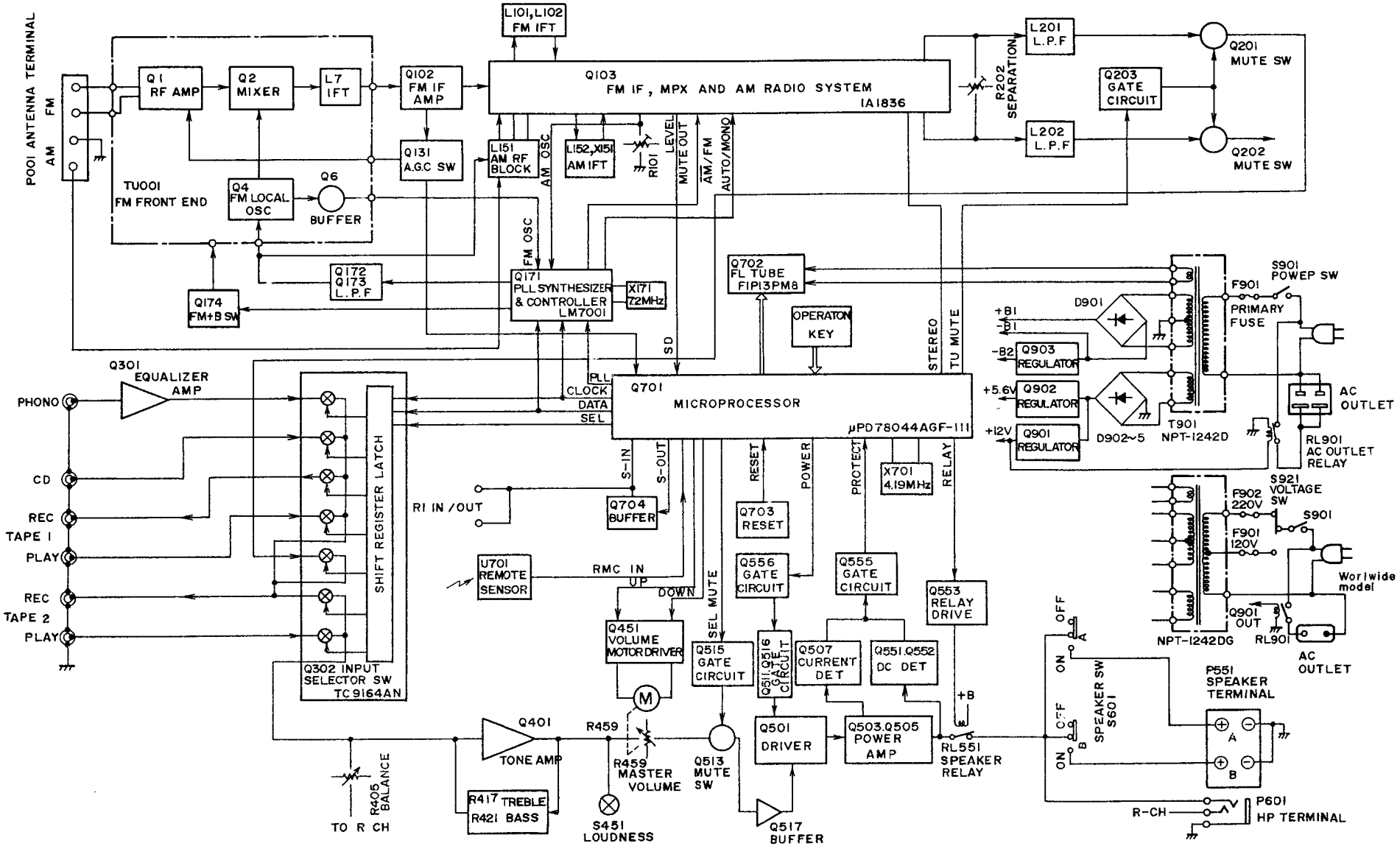
REF. NO.	PART NO.	DESCRIPTION
1	27110845Y	Front bracket ass'y <D/A/W> <B>
	27110843Y	Front bracket ass'y <P> <B>
	27110844Y	Front bracket ass'y <S>
4	28133337Y	Back plate
5	27100297BY	Chassis
6	27160352AY	Radiator
9	27141443Y	Bracket PC
13	27122021BY	Rear panel <D>
	27122022AY	Rear panel <P>
	27122024AY	Rear panel <W>
	27122065AY	Rear panel <A>
15	27300750	⚠ Bushing,cord
16	27190428-1	LSR-10R,Holder
17	27190524-1	LSR-14R,Holder
18	834230108	3TTS+10B(Ni), Nickel screw
20	830440089	4TTC+8C(BC),Self-tapping screw
21	838130088	3TTB+8B,Self-tapping screw
25	838430107	3TTB+10S(BC),Self-tapping screw
26	801433	3SMS8W.SW+14B(BC),Special screw
31	28184595Y	Top cover <B>
	28184596Y	Top cover <S>
32	838430088	3TTB+8B(BC),Self-tapping screw <B>
	838230088	3TTB+8B(Ni),Self-tapping screw <S>
33	28140680	0.5×8×180,Cushion
51	1A585121Y	Front panel ass'y <D/A><B>
	1A588121Y	Front panel ass'y <P><B>
	1A589121Y	Front panel ass'y <S>
52	28125226-6Y	End cap L <B>
	28125279Y	End cap L <S>
53	28125227-6Y	End cap R <B>
	28125280Y	End cap R <S>
54	27267693Y	Guide, power <B>
	27267856Y	Guide, power <S>
55	28324179Y	Knob <B>
	28325100Y	Knob <S>
56	27267694Y	Guide, volume <B>
	27267857Y	Guide, volume <S>
58	28191720Y	Clear plate
59	833430080	3TTP+8P(BC),Self-tapping screw
61	27175292	Leg
62	838130088	3TTB+8B,Self-tapping screw
81	28324162Y	Knob, Loudness <B>
	28325097Y	Knob, Loudness <S>
82	28324150-1B	Knob, Level <B> —
	28325096	Knob, Level <S>
83	28325074	Knob,Volume <B>
	28325075	Knob,Volume <S>
85	28324140	Knob,Power <B>
	28324974Y	Knob,Power <S>
86	28324170	Knob, Speaker A <B>
	28325098Y	Knob, Speaker A <S>
87	23824171	Knob, Speaker B <B>
	23825099Y	Knob, Speaker B <S>
91	223021	⚠ Isolation sheet
93	260220Y	Clamp
F901	252163Y	⚠ 4A-UL/T-237,Primary fuse <D/W>
F902	252073	⚠ 1.6A-SE-EAK,Primary fuse <P/W/A>
F903	252073	⚠ 1.6A-SE-EAK,AC outlet fuse <P>
JL702	2047211512Y	NCFC7-211512, Flexible flat cable
P901	253192HIT	⚠ AS-UC-6 #18, Power supply cord <D> —
	253193HIT	⚠ AS-CEE, Power supply cord <P/W>
	253197HIT	⚠ AS-SAA, Power supply cord <A>
P902	25060044	Terminal GND
P904	25050904	⚠ NSCT-2P697, AC outlet <A>
Q503,Q504	2202492,	2SA1264N-R,
	2202493,	2SA1264N-O,
	2202243,	2SA1694-O,
	2202244 or	2SA1694-Y or
	2202246	2SA1694-P,Power amplifier transistor
Q505,Q506	2202502,	2SC3812N-R,
	2202503,	2SC3812N-O,
	2202253,	2SC4467-O,
	2202254 or	2SC4467-Y or
	2202256	2SC4467-P,Power amplifier transistor
T901	2301109Y	⚠ NPT-1242D,Power transformer <D>
	2301110Y	⚠ NPT-1242P,Power transformer <P/A>
	2301111Y	⚠ NPT-1242DG,Power transformer <W>
U1	1A585533-1Y	NAAR-5433-1, Main circuit pc board ass'y <D>
	1A588533-1AY	NAAR-5433-1A, Main circuit pc board ass'y <P>
	1A585533-1BY	NAAR-5433-1B, Main circuit pc board ass'y <W>
	1A585533-1CY	NAAR-5433-1C, Main circuit pc board ass'y <A>
U2	1A585534-1Y	NAETC-5434-1, Headphone terminal pc board ass'y <D>
	1A588534-1AY	NAETC-5434-1A, Headphone terminal pc board ass'y <P/A/W>
U3	1A585535-1Y	NAETC-5435-1, Secondary terminal pc board ass'y <D>
	1A588535-1AY	NAETC-5435-1A, Secondary terminal pc board ass'y <P/A/W>
U4	1A585537-1Y	NADIS-5437-1, Display circuit pc board ass'y <D>
	1A588537-1AY	NADIS-5437-1A, Display circuit pc board ass'y <P>
	1A585537-1BY	NADIS-5437-1B, Display circuit pc board ass'y <W>
	1A585537-1CY	NADIS-5437-1C, Display circuit pc board ass'y <A>
U5	1A585538-1Y	NAAF-5438-1, Volume circuit pc board ass'y
U6 —	1A585539-1Y	NAAF-5439-1, Tone control circuit pc board ass'y <D>
	1A588539-1AY	NAAF-5439-1A, Tone control circuit pc board ass'y <P/A/W>
U7	1A585540-1Y	NAPS-5440-1, Power supply pc board ass'y <D>
	1A588540-1AY	NAPS-5440-1A, Power supply pc board ass'y <P>
	1A585540-1BY	NAPS-5440-1B, Power supply pc board ass'y <W>
	1A585540-1CY	NAPS-5440-1C, Power supply pc board ass'y <A>
U8	1A585541-1Y	NAETC-5441-1, Primary terminal pc board ass'y
U9	1A585542-1Y	NAETC-5442-1, AC outlet pc board ass'y <D>
U10	1A585545-1Y	NAETC-5445-1, Power switch pc board ass'y
U11	1A588543-1Y	NAETC-5443-1, AC outlet pc board ass'y <P/W>
U12	1A585544-1Y	NASW-5444-1, Voltage selector switch pc board ass'y <W>

NOTE: <B>:Black model only
<S>:Silver model only
<D>:120 V model only
<P>:230 V model only
<W>:Wolrdwide model only
<A>:Ausralian model only

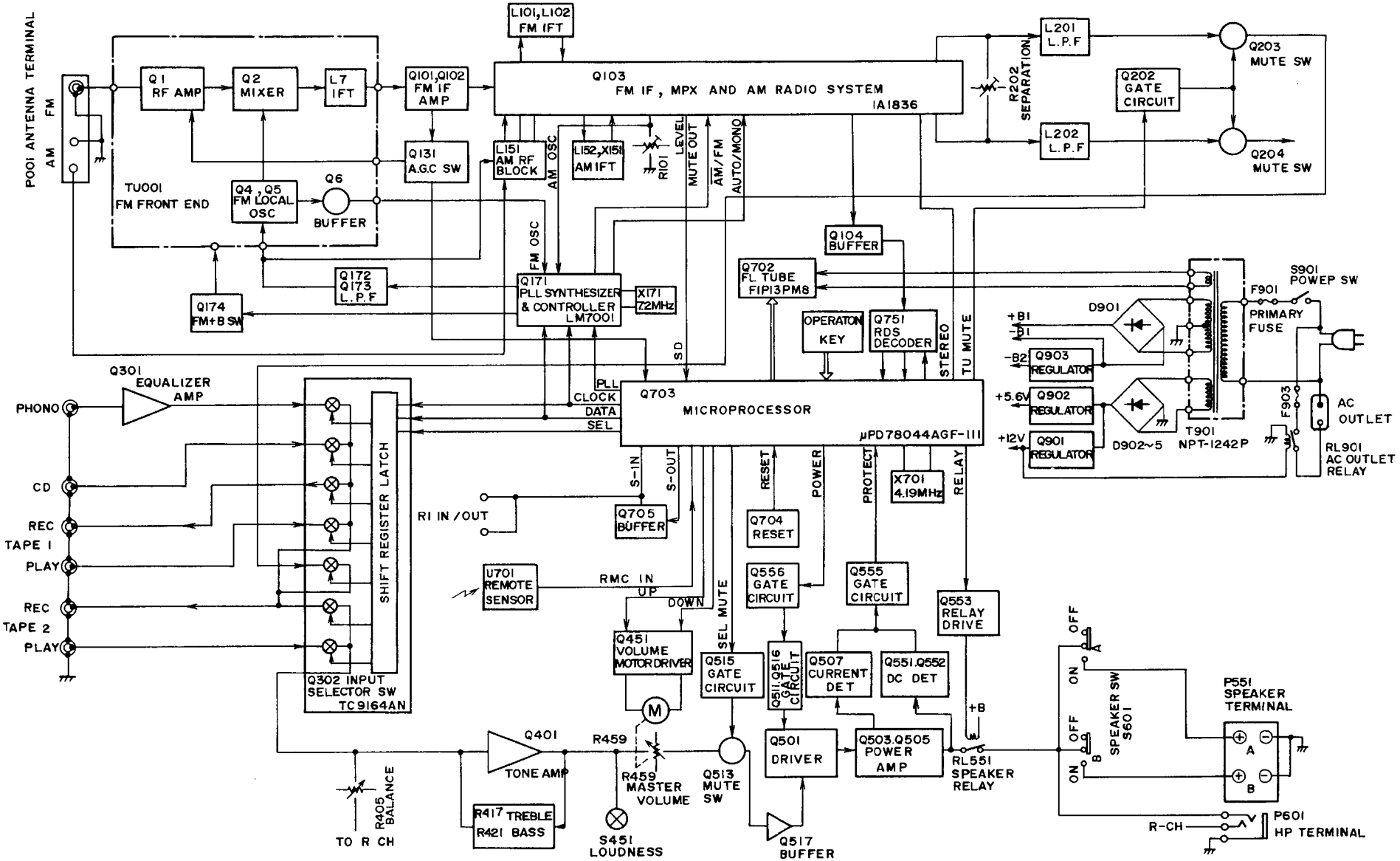
NOTE: THE COMPONENTS IDENTIFIED BY MARK ⚠ ARE CRITICAL FOR RISK OF FIRE AND ELECTRIC SHOCK, REPLACE ONLY WITH PART NUMBER SPECIFIED.

BLOCK DIAGRAM

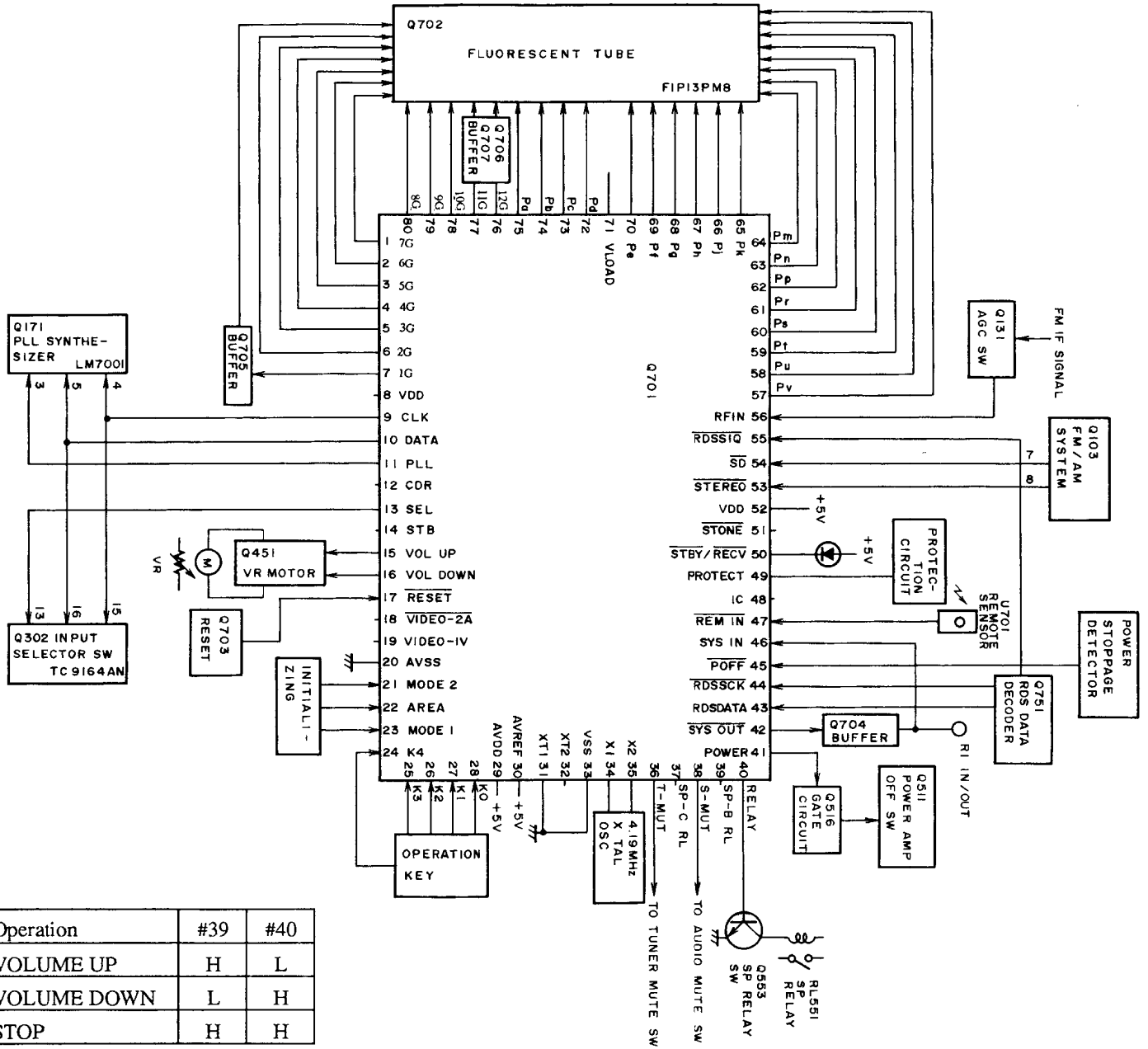
120V/WORLD WIDE MODELS



230V MODEL


P001 ANTENNA TERMINAL
AM FM
Q1 RF AMP
Q2 MIXER
L7 IFT
Q101,Q102 FM IF AMP
L101,L102 FM IFT
Q103 FM IF, MPX AND AM RADIO SYSTEM IA1836
R202 SEPARATION
L201 L.P.F
L202 L.P.F
Q202 GATE CIRCUIT
Q203 MUTE SW
Q204 MUTE SW
TU001 FM FRONT END
Q4, Q5 FM LOCAL OSC
Q6 BUFFER
Q131 A.G.C SW
L151 AM RF BLOCK
L152, X151 AM IFT
R101 LEVEL
MUTE OUT
AM/FM
AUTO/MONO
AM OSC
FM OSC
Q104 BUFFER
Q172 Q173 L.P.F
Q174 FM+B SW
Q171 PLL SYNTHESIZER & CONTROLLER LM7001
X171 72MHz
Q702 FL TUBE FIPI3PM8
OPERATON KEY
Q751 RDS DECODER
STEREO
TU MUTE
SD
S901 POWEP SW
F901 PRIMARY FUSE
D901
+B1
-B1
-B2
Q903 REGULATOR
+5.6V
Q902 REGULATOR
+12V
Q901 REGULATOR
D902~5
T901 NPT-1242P
F903
AC OUTLET
RL901 AC OUTLET RELAY
Q301 EQUALIZER AMP
PHONO
CD
REC TAPE 1
PLAY
REC TAPE 2
PLAY
SHIFT REGISTER LATCH
Q302 INPUT SELECTOR SW TC9164AN
PLL CLOCK DATA SEL
Q703 MICROPROCESSOR μPD78044AGF-111
S-IN
S-OUT
RESET
POWER
PROTECT
RELAY
X701 4.19MHz
RI IN/OUT
Q705 BUFFER
Q704 RESET
U701 REMOTE SENSOR
RMC IN
UP
DOWN
Q556 GATE CIRCUIT
Q555 GATE CIRCUIT
Q553 RELAY DRIVE
SEL MUTE
Q451 VOLUME MOTOR DRIVER
Q515 GATE CIRCUIT
Q511,Q516 GATE CIRCUIT
Q507 CURRENT DET
Q551,Q552 DC DET
+B
OFF
ON
SPEAKER SW S601
P551 SPEAKER TERMINAL
Q401 TONE AMP
R459 MASTER VOLUME
Q513 MUTE SW
Q501 DRIVER
Q503,Q505 POWER AMP
RL551 SPEAKER RELAY
R405 BALANCE
TO R CH
R417 TREBLE
R421 BASS
S451 LOUDNESS
Q517 BUFFER
R-CH
P601 HP TERMINAL

MICROPROCESSOR CONNECTION DIAGRAM



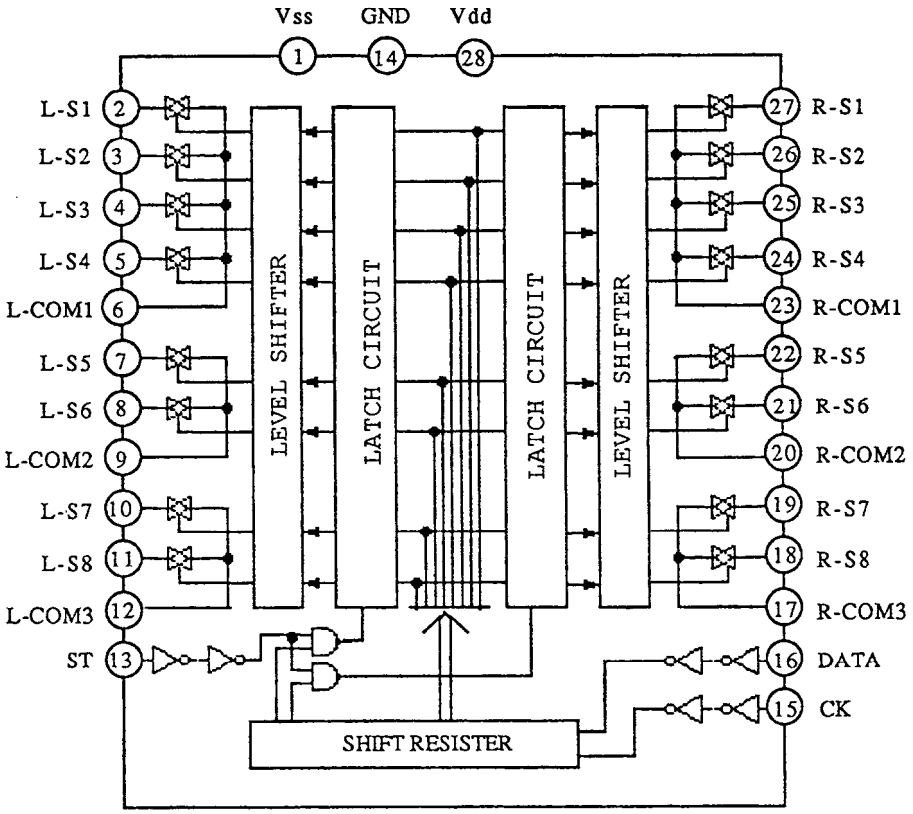
Operation	#39	#40
VOLUME UP	H	L
VOLUME DOWN	L	H
STOP	H	H

TERMINAL DESCRIPTIONS

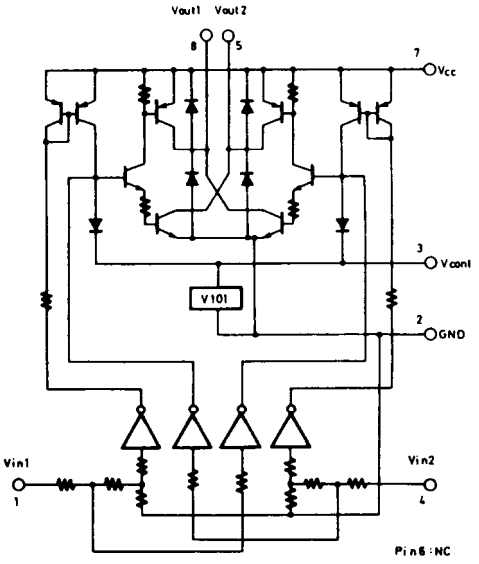
Pin No.	Function	I/O	Description
1~7	7G~1G	O	Grid control output pin. On at the high level.
8	VDD		Power supply pin (+5V)
9	CL	O	Clock output pin. Connect to the terminals CKl of function switch IC and PLL IC.
10	DATA	O	Data output pin. Connect to the terminals DATA of function switch IC and PLL IC.
11	PLL	O	Chip enable output pin for PLL IC
13	SEL	O	Chip enable output pin for function switch IC
15	VOLUP	O	Volume control output pin
16	VOLDOWN	O	Refer table 1.
17	$\overline{\text{RESET}}$	I	System reset input pin
20	AVSS		Ground pin of A/D converter
21	MODE	I	Initializing input of operation mode
22	BAND	I	Initializing input of band region
23	MODEl	I	Initializing input of operation mode
24	K4	I	Operation key connection pin
25	K3	I	Operation key connection pin
26	K2	I	Operation key connection pin
27	K1	I	Operation key connection pin
28	K0	I	Operation key connection pin
29	AVDO		Analogue power supply of A/D converter
30	AVREF		Reference voltage input pin of A/D converter
31	XT1		Crystal connection pin for sub system clock resonator
32	XT2		Not used.
33	VSS		Ground pin
34	X1		Resonator connection terminal for main system clock
35	X2		Connect the ceramic resonator 4.19MHz.
36	TMUT	O	Muting output pin for tuner section
38	SMUT	O	Muting output pin for amplifier section
40	RELAY	O	Relay control pin for speaker
41	POWER	O	Power source control output pin
42	$\overline{\text{SYSOUT}}$	O	System code output pin
43	RDSDATA	I	Data input pin from RDS decoder μPD1346CS
43	SYSIN	I	System code input pin
44	$\overline{\text{RDSSCK}}$	I	Clock input pin from RDS decoder IC μPD1346CS
45	$\overline{\text{POFF}}$	I	Power stoppage detector input pin
47	$\overline{\text{REMIN}}$	I	Remote control signal input pin
48	IC		Internal connection pin. Connect to the ground terminal.
49	PROTECT	I	Detector input pin of protection circuit. H:On
50	$\overline{\text{STBY}}$/$\overline{\text{RECV}}$	O	Stand-by and received indicator output pin
52	VDD		Power supply pin (+5V)
53	$\overline{\text{STEREO}}$	I	Detector input pin of FM stereo broadcast
54	$\overline{\text{SD}}$	I	Detector input pin of broadcast more than muting level
55	$\overline{\text{RDSSIG}}$	I	Detector input pin of RDS broadcast. L:RDS broadcast
56	RFIN	I	RF mode input pin. Local at the low level.
57~70	Pv~Pe	O	Segment output pins. On at the high level.
71	VLOAD	I	Pull-down resistor connection pin of controller and driver of FL.
72~75	Pd~Pa	O	Segment output pins. On at the high level.
76~80	12G~8G	O	Grid control output pin. On at the high level.

IC BLOCK DIAGRAMS AND DESCRIPTIONS

TC9164N (Analog Switch)



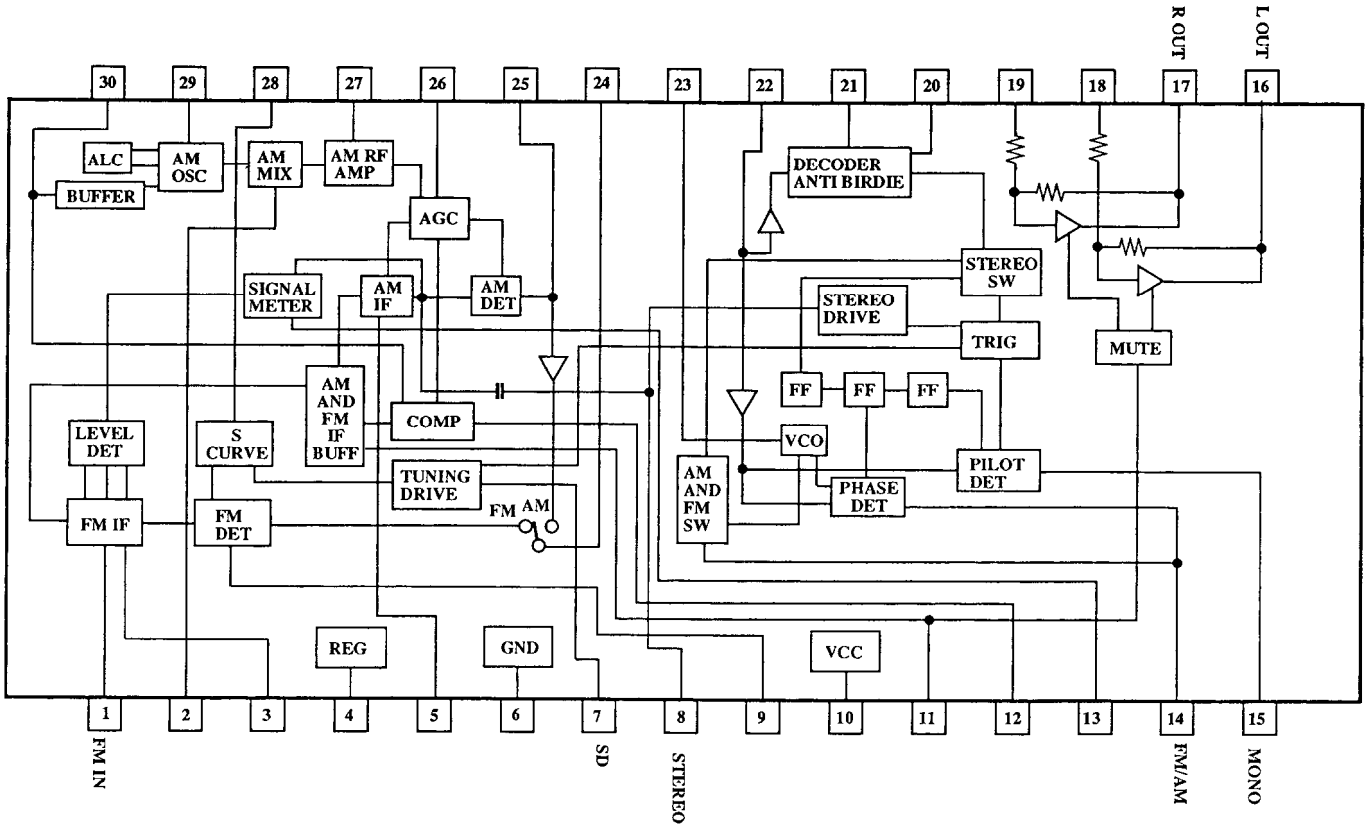
LB1639 (VOLUME MOTOR)



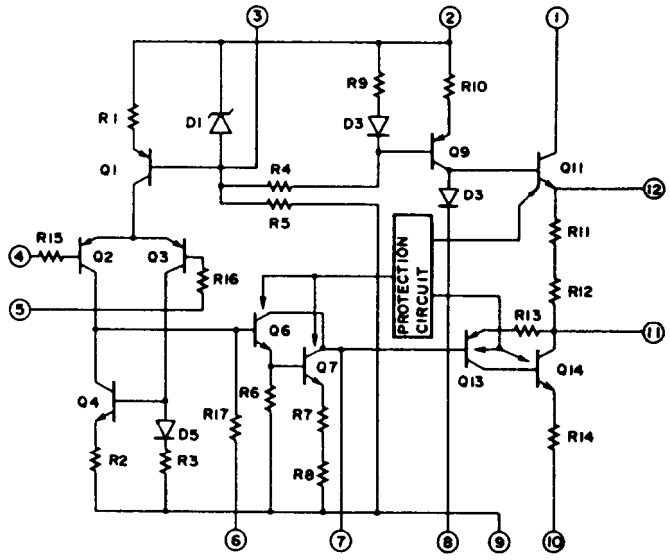
TRUTH TABLE

IN 1	IN 2	OUT 1	OUT 2	MOTOR
H	L	H	L	Normal
L	H	L	H	Reverse
H	H	OFF	OFF	Wait
L	L	OFF	OFF	Wait

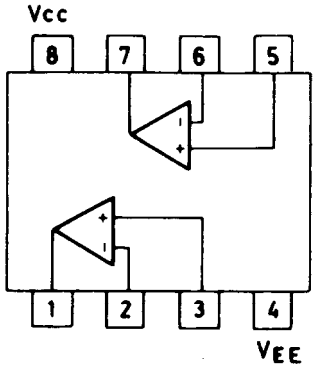
LA1836 (FM and AM Radio System)



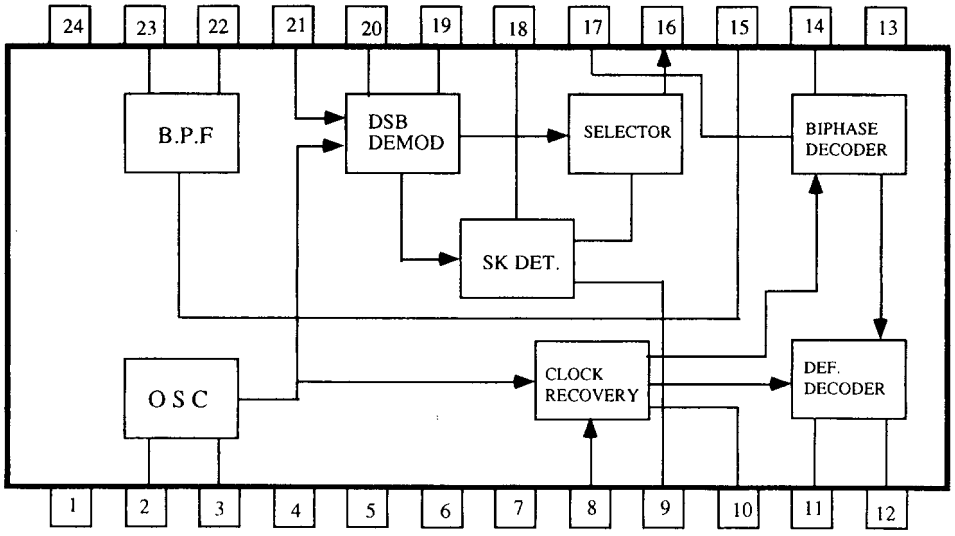
μPC1225H(Power amplifier driver)



NJM4558D-X (Operation amplifier)

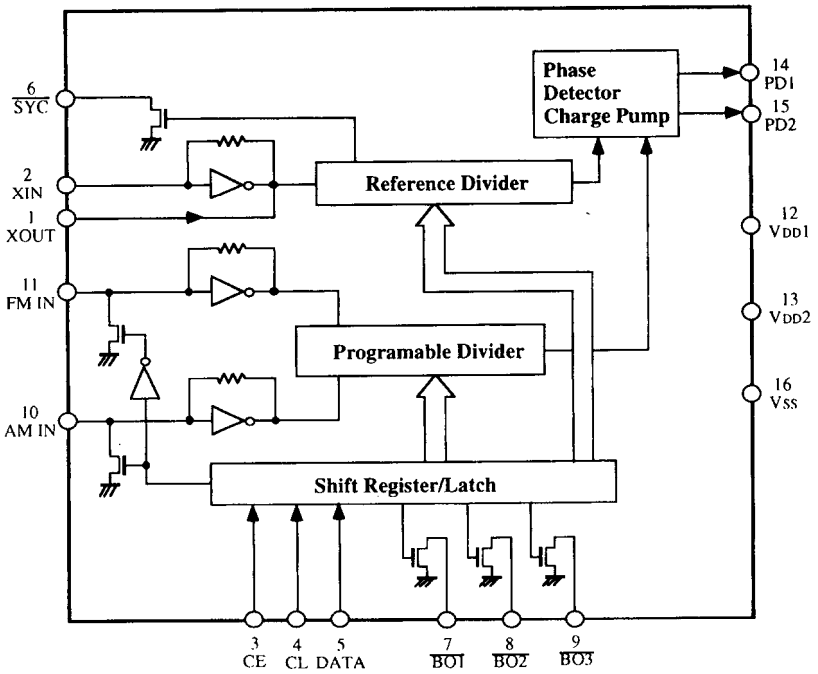


μPC1346CS (RDS Decoder)



No.	Terminal	Description	No.	Terminal	Description
1	Vcc	Supply voltage for the digital circuit	13	GND	Ground for the analog circuit
2	OSC IN	Resonator input	14	INTEG	Integrating filter terminal
3	OSC OUT	Resonator output	15	BPF ADJ	Adjustment fc of band pass filter
4	GND	Ground for the digital circuit	16	PSK OUT	Biphase signal output
5	TEST1	Test input	17	PSK IN	Biphase decoder input
6	TEST2	Test input	18	LPF SK	Low pass filter for the detection SK
7	OP.CTL	Control input of the operation stop	19	LPF Q	Low pass filter for the crossed detector
8	S/L CTL	Mode control input of the synchonizing detection	20	LPF I	Low pass filter for the synchronizing detector
9	SK OUT	SK detection output	21	DSB IN	DSB demodulator circuit input
10	RDS OUT	RDS synchonizing detection output	22	BPF OUT	Band pass filter output
11	CLOCK OUT	Bit rate clock output	23	BPF IN	Band pass filter input
12	DATA OUT	RDS data output	24	Vcc	Supply voltage for analog circuit

LM7001 (PLL Synthesizer and Controller)



Pin No.	Terminal	Description
1	XOUT	Connect the 7.2MHz crystal resonator.
2	XIN	
3	CE	Chip enable terminal. Connect to the terminal PLLCE1 of microprocessor.
4	CL	Serial clock input terminal. Connect to the terminal PLLCL of microprocessor.
5	DATA	Serial data input terminal. Connect to the terminal PLLDATA of microprocessor.
6	$\overline{SYN}$	Not used.
7	$\overline{SAT}$/CANLE	Power source control terminal for DSR. Cable at the high level and Satellite at low.
8	LPF	LPF selector output.
9	ANT	Antenna selector output. A at high level and B at low level.
10	AMIN	AM local oscillator input terminal.
11	FMIN	FM local oscillator input terminal.
12	VDD1	Power source terminal for back-up.
13	VDD2	Power source terminal.
14	PD1	Phase comparator output
15	PD2	Phase comparator output
16	Vss	Ground terminal

ADJUSTMENT PROCEDURES

Preparation

1. Input

FM mono: 1kHz, 75kHz devi., 60dB/μ V

FM stereo: 1kHz, 67.5kHz devi., 60dB/μ V

Pilot signal 19kHz 7.5kHz devi.

AM: 400Hz, 30% mod.

2. Outputs

Connect the non-inductive type resistor of 8 ohms to the all speaker terminals unless otherwise noted.

3. Standard Knob Positions

Master Volume Control .....Maximum
Bass Control .....Center
Treble Control .....Center
Balance Control .....Center
Input selector .....CD
Tape 2 Monitor.....OFF
Muting .....OFF
Loudness .....OFF
Speaker A.....ON
Speaker B.....OFF

Idling Current Adjustment

Connect the DC voltmeter to the terminals P501, and P502 (V_{CT} and I_{ID}) on the main circuit pc board. Adjust the trim resistors R501 and R502 so that the indicator of voltmeter becomes 4 $\pm$ 0.5mV.

NOTE:Adjust after switching on for 5 minutes.
Set Volume knob to the minimum position.

1.FM ADJUSTMENT

Item	Step	Connection of instrument	FM SG output	Stereo modulator output	Tuning frequency	Output indicator	Adjustment point	Adjust for	Remarks
FM IF/RF	1	Fig.1	99.0MHz 1kHz 75kHz devi. 65dBf(60dB)	———	99.0MHz	DC voltmeter	L101	0±20mV	FM MUTE/MODE switch:ON/AUTO Repeat the steps 1 and 3 until no further adjustment is necessary.
	2					AC voltmeter	IFT on the front end	Maximum	
	3					Distortion analyzer	L102	Minimum	
Stereo Distortion		Fig.2	99.0MHz Ext. mod.65dBf(60dB)	Channel L or R 1kHz	99.0MHz	Distortion analyzer	IFT on the front end	Minimum	Don't turn more than ±180°
Muting Level		Fig.2	99.0MHz 17.2dBf(12dB) 19.2dBf(14dB)	———	99.0MHz	Oscilloscope	R101	Signal output	12dB (120V model) 14dB (Other model)
RDS		Fig.3	99.0MHz Ext. mod.60dB	RDS data or 57kHz 3% devi.	99.0MHz	Oscilloscope	R781	Maximum	TX-8210R only

2.AM ADJUSTMENT

120V model

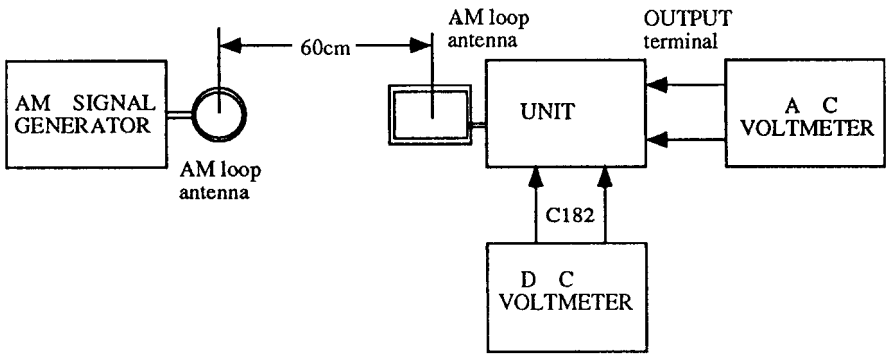
Step	AM SG output	Tuning Frequency	Output Indicator	Adjustment point	Adjust for
1		530kHz	Digital DC voltmeter	OSC coil on RF block L151	1.3±0.2V
2	600kHz 400Hz 30% mod. 60dB/m	600kHz	AC voltmeter	RF coil on RF block L151	Maximum
3	990kHz 400Hz 30% mod. 60dB/m	990kHz	AC voltmeter	L152	Maximum

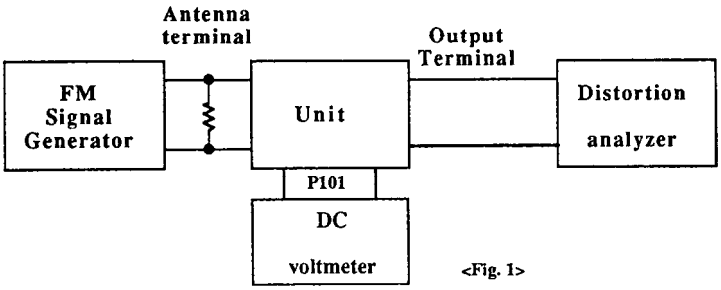
Reference Specification
FM tuned voltage:87.9MHz~107.9MHz
More than 1.3V~less than 10.0V
AM tuned voltage:530kHz~1710kHz
1.3V±0.2V~less than 9.0V

230V and Wolrdwide models

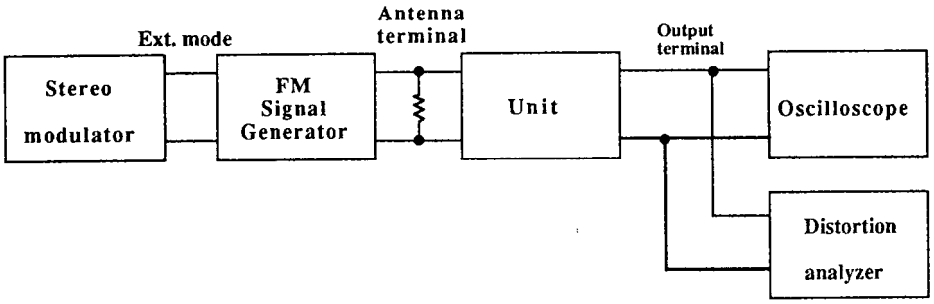
Step	AM SG output	Tuning Frequency	Output Indicator	Adjustment point	Adjust for
1		522kHz or 531kHz	Digital DC voltmeter	OSC coil on RF block L151	1.3±0.2V
2	603kHz 400Hz 30% mod. 60dB/m	603kHz	AC voltmeter	RF coil on RF block L151	Maximum
3	999kHz 400Hz 30% mod. 60dB/m	999kHz	AC voltmeter	L152	Maximum

Reference Specification
FM tuned voltage:87.5MHz~108.0MHz
More than 1.3V~less than 10.0V
AM tuned voltage:522kHz~1611kHz
1.3V±0.2V~less than 9.0V
(230V model)
AM tuned voltage:531kHz~1602kHz
1.3V±0.2V~less than 9.0V
(Worldwide model)

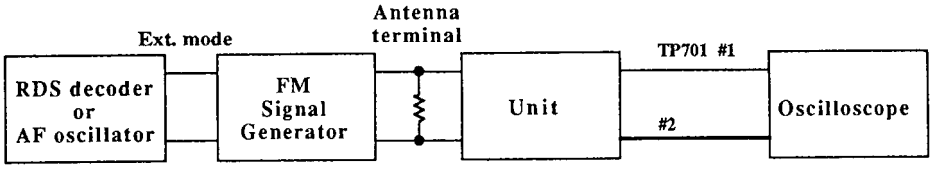




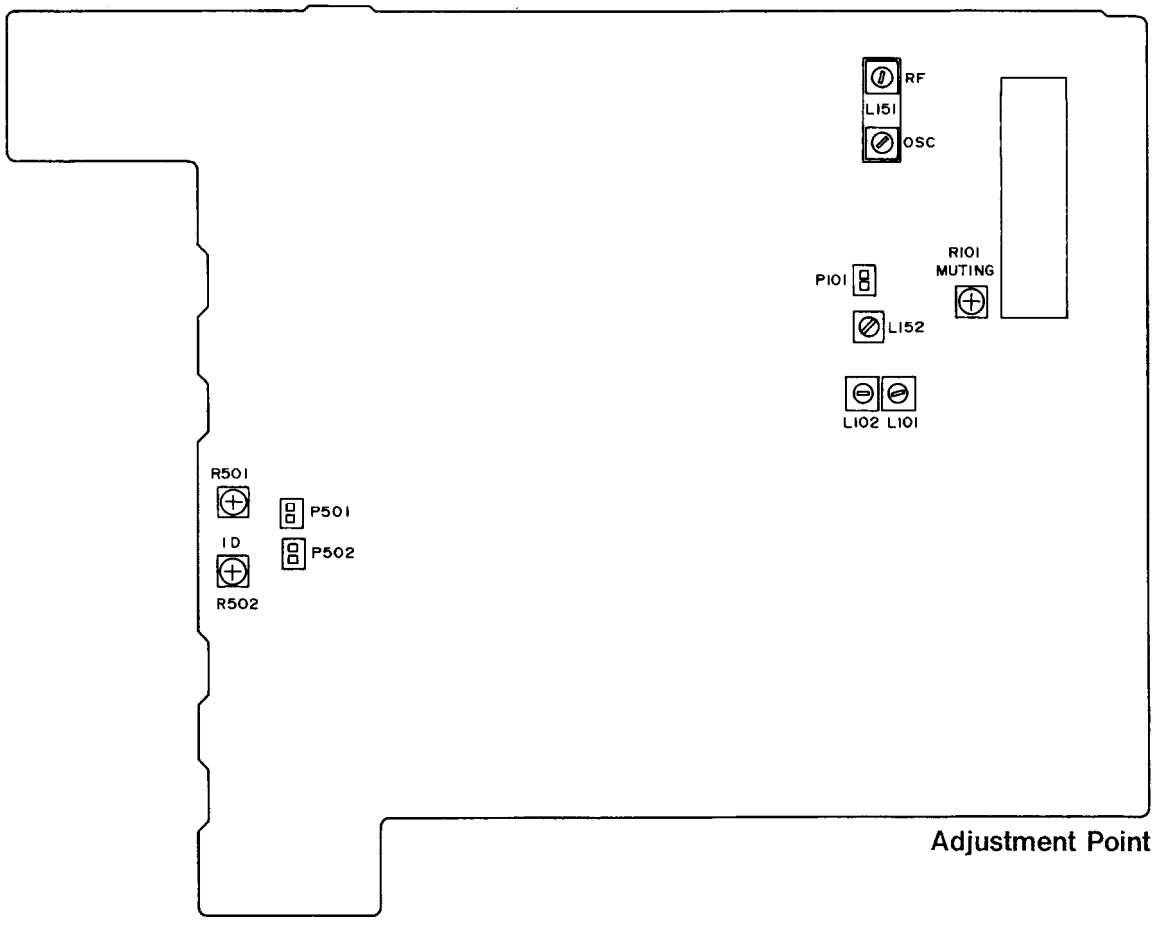
<Fig. 1>



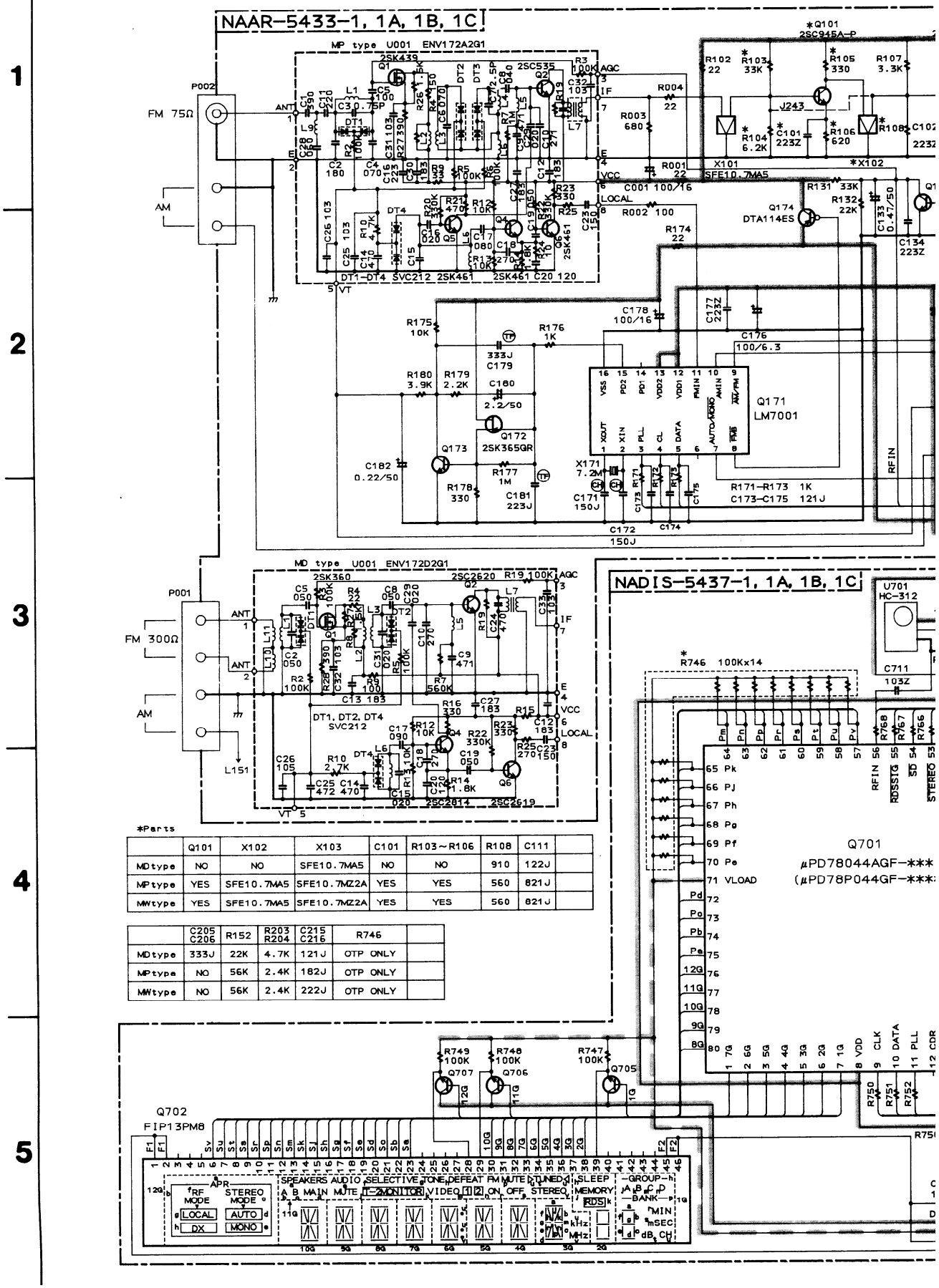
<Fig. 2>



<Fig. 3>



SCHEMATIC DIAGRAM

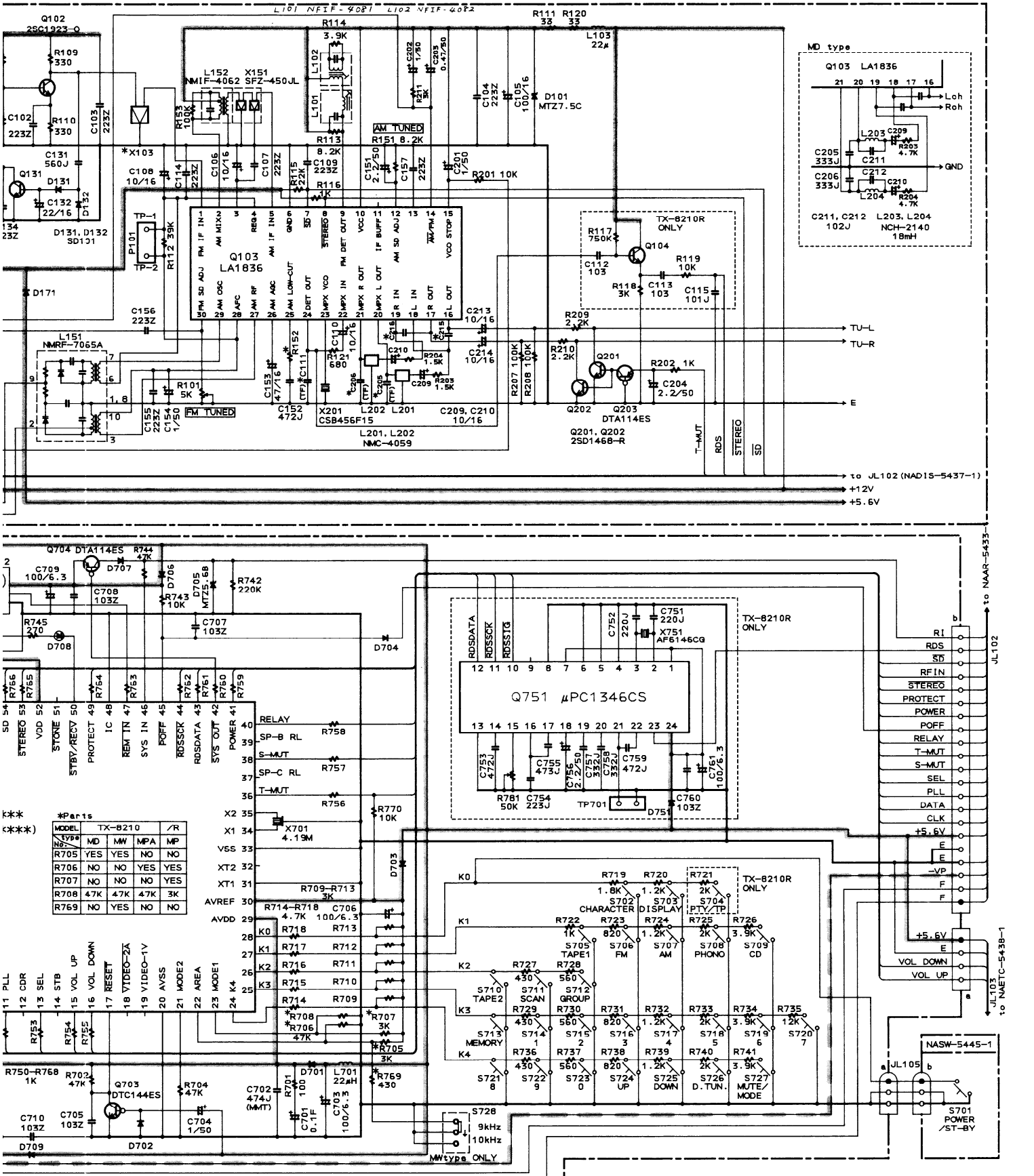


*Parts

	Q101	X102	X103	C101	R103~R106	R108	C111	
MDtype	NO	NO	SFE10.7MA5	NO	NO	910	122J	
MPtype	YES	SFE10.7MA5	SFE10.7MZ2A	YES	YES	560	821J	
MWtype	YES	SFE10.7MA5	SFE10.7MZ2A	YES	YES	560	821J	

	C205 C206	R152	R203 R204	C215 C216	R746	
MDtype	333J	22K	4.7K	121J	OTP ONLY	
MPtype	NO	56K	2.4K	182J	OTP ONLY	
MWtype	NO	56K	2.4K	222J	OTP ONLY	

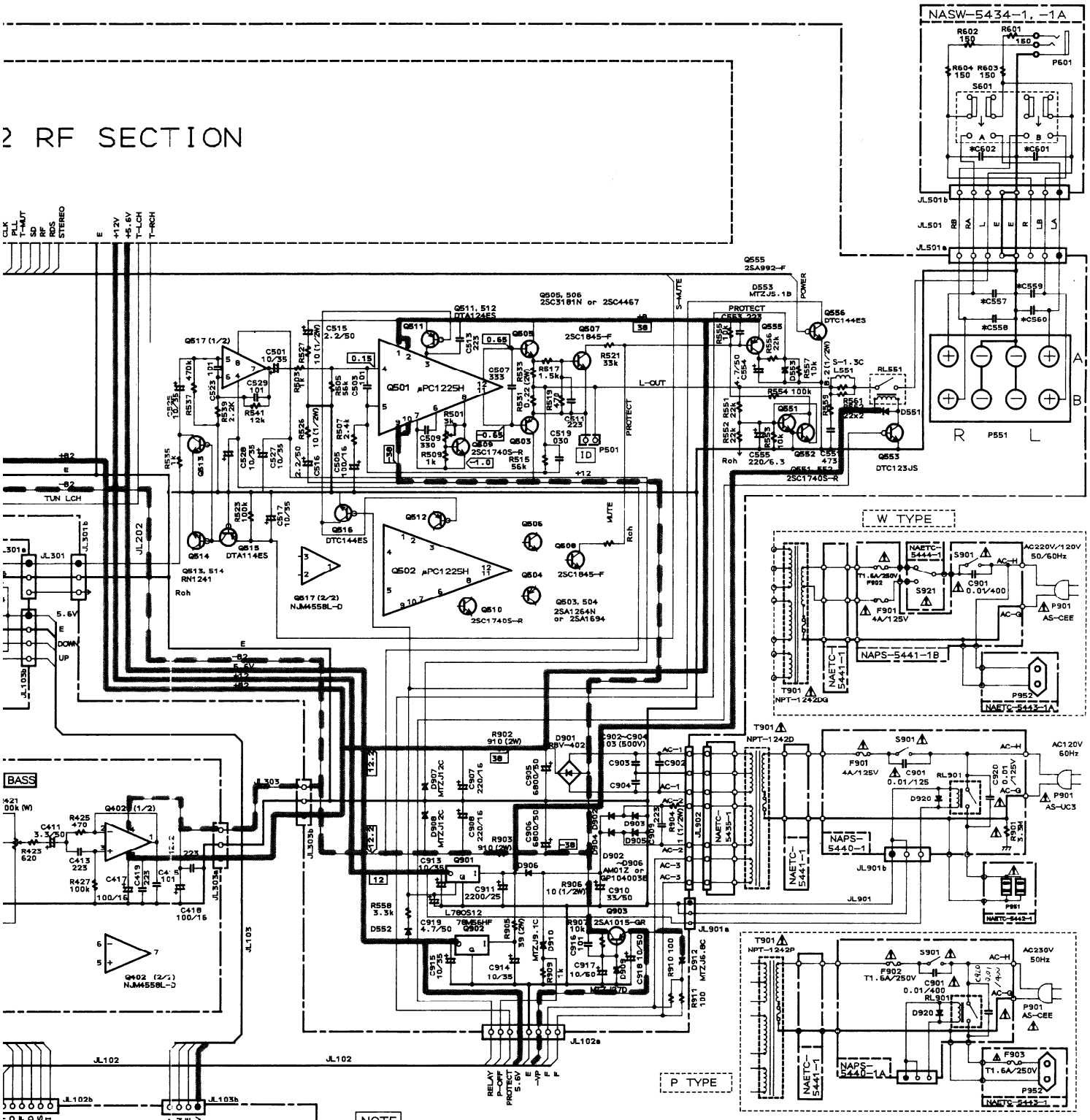
D E F G



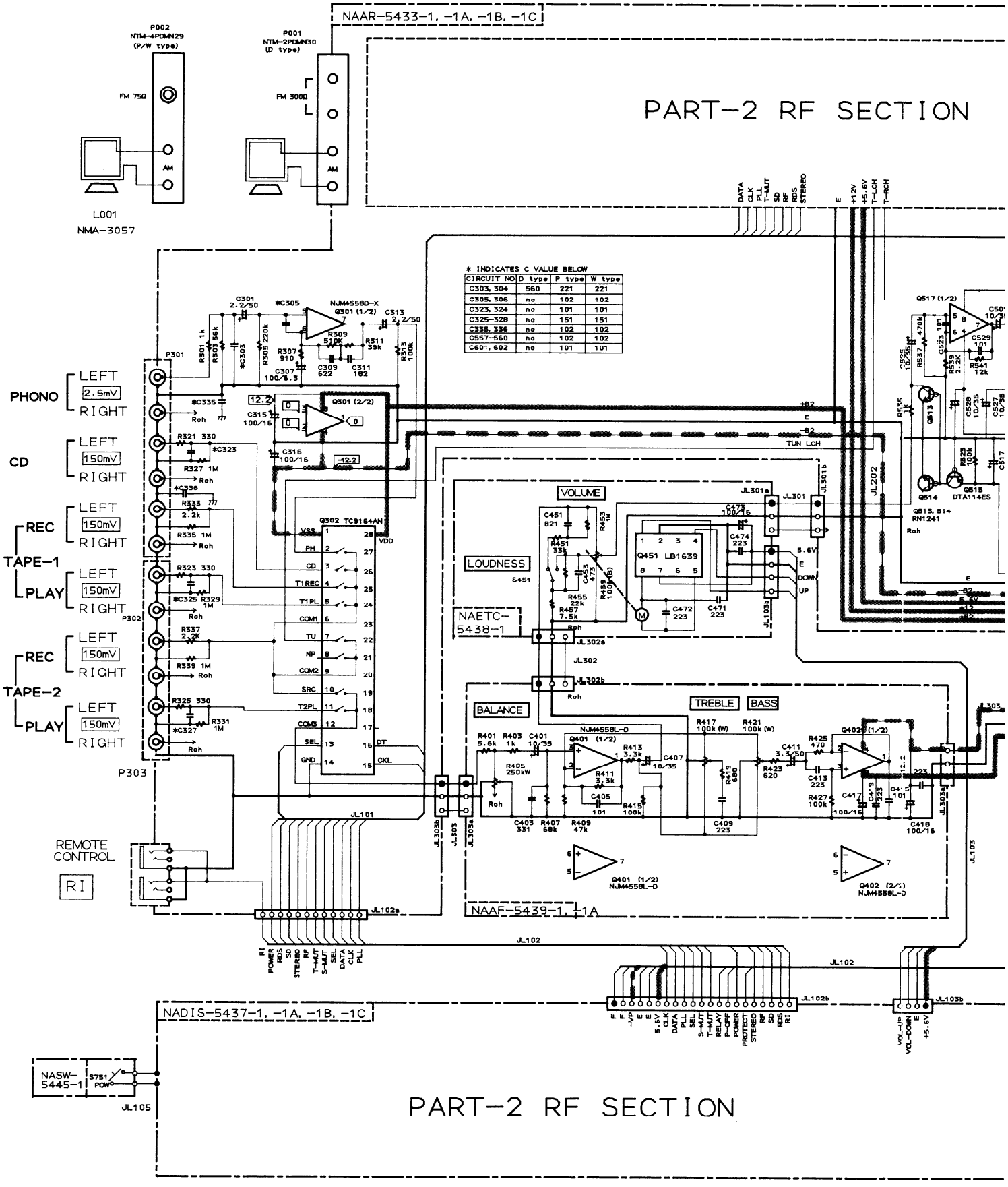
*Parts

MODEL	TX-8210			/R
type NO.	MD	MW	MPA	MP
R705	YES	YES	NO	NO
R706	NO	NO	YES	YES
R707	NO	NO	NO	YES
R708	47K	47K	47K	3K
R769	NO	YES	NO	NO

2 RF SECTION


NASW-5434-1, -1A
W TYPE
P TYPE
BASS
NOTE
THE COMPONENTS IDENTIFIED BY MARK ⚠ ARE CRITICAL FOR SAFETY. REPLACE ONLY WITH PART NUMBER SPECIFIED.
VOLTAGE (MEASURED WITH VOLTMETER) IS DC VOLTAGE. (NO INPUT SIGNAL)
ALL PNP TRANSISTORS ARE EQUIVALENT TO 2SA933 UNLESS OTHERWISE NOTED.
ALL NPN TRANSISTORS ARE EQUIVALENT TO 2SC1740 UNLESS OTHERWISE NOTED.
ALL DIODES ARE EQUIVALENT TO 1SS270A UNLESS OTHERWISE NOTED.
ELECTROLYTIC CAPACITORS (#) ARE IN μF/WV.
ALL CAPACITORS ARE IN pF/50WV UNLESS OTHERWISE NOTED.
EX) 3pF→030, 33pF→330, 330pF→331, 0.033μF→333
ALL RESISTORS ARE IN OHMS 1/4 WATTS UNLESS OTHERWISE NOTED.
THE THICK LINES IN PC BOARD ARE THE PRINTING SIDE OF THE PARTS.
EX) ▬▬ PRINTING SIDE
CIRCUIT IS SUBJECT TO CHANGE FOR IMPROVEMENT.

CHEMATIC DIAGRAM



PRINTED CIRCUIT BOARD-PARTS LIST

MAIN CIRCUIT PC BOARD (NAAR-5433-1/1A/1B/1C)

CIRCUIT NO.	PART NO.		DESCRIPTION
	Front end		
TU001	240104Y		ENV172D2G1 <D>
	240103Y		ENV172A2G1 <P/W/A>
	ICs		
Q103	22240890		LA1836
Q171	22240090		LM7001
Q301	222502		NJM4558D-X
Q302	22240800		TC9164AN
Q501,Q502	22240108		μPC1225H
Q517	22240293		NJM4558L-D
Q901	222780126		L78OS12
Q902	222780565JRC		78M56
	Transistors		
Q101	2210746		2SC945A-P <P/W/A>
Q102	2211723		2SC1923-O
Q104	2213284 or		2SC1740S-R or
	2212115		2SC2458-GR <P>
Q131,Q173	2213284 or		2SC1740S-R or
	2212115		2SC2458-GR
Q172	2212445		2SK365-GR
Q174,Q203	2213510 or		DTA114ES or
Q515	2214350		RN2202
Q201,Q202	2212794		2SD1468-R
Q503,Q504	2202492,	*	2SA1264N-R,
	2202493,	*	2SA1264N-O,
	2202243,	*	2SA1694-O,
	2202244 or	*	2SA1694-Y or
	2202246	*	2SA1694-P
Q505,Q506	2202502,	*	2SC3181N-R,
	2202503,	*	2SC3181N-O,
	2202253,	*	2SC4467-O,
	2202254 or	*	2SC4467-Y or
	2202256	*	2SC4467-P
Q507,Q508	2211732		2SC1845-F
Q509,Q510	2213284 or		2SC1740S-R or
Q551,Q552	2212115		2SC2458-GR
Q511,Q512	2212600		DTA124ES
Q513,Q514	2213631 or		RN1241-A or
	2213632		RN1241-B
Q516,Q556	221282 or		DTC144ES or
	2213560		RN1204
Q553	2213640		DTC123JS
Q555	2211792		2SA992-F
Q903	2211455		2SA1015-GR
	Diodes		
D101	224470753		MTZJ7.5C
D131,D132	223191		SD101
D171	223205 or		1SS270A or
D551,D552	223163		1SS133
D553	224470512		MTZJ5.1B
D901	22380022		RBV402
D902~D906	22380035 or		GP104003E or
	22380046		AM01Z
D907,D908	224471203		MTZJ12C
D909	224472704		MTZJ27D
D910	224470913		MTZJ9.1C
D912	224470683		MTZJ6.8C

CIRCUIT NO.	PART NO.	DESCRIPTION
	Coils and Transformers	
L101	233457Y	NFIF-4081
L102	233458Y	NFIF-4082
L103	233454K220	NCH-1452 220K
L151	232163A	NMRF-7065A,RF block
L152	232139	NMIF-4062
L201,L202	233355A	NMC-4059 <P/W/A>
L203,L204	231092	NCH-2140 <D>
L551,L552	231176S	S-1.3C
	Resonator	
X171	3010158 or	XTL-7.2M or
	3010141	XTL-7.2M,Crystal
X201	3010227	CSB456F15
	Ceramic filters	
X101	3010246Y	FFE1070MA11UXL
X102	3010246Y	FFE1070MA11UXL <P/W/A>
X103	3010246Y	FFE1070MA11UXL <D>
	3010130	SFE10.7MZ2A <P/W/A>
X151	3010123	SFZ450JL
	Capacitors	
C001,C105	354741019	100μF,16V,Elect.
C106,C110	354741009	10μF,16V,Elect.
C108,C133	354784799	0.47μF,50V,Elect.
C109,C151	354780229	2.2μF,50V,Elect.
C111	374721524	1500pF±5%,50V,Plastic <D>
	374721024	1000pF±5%,50V,Plastic <P/A>
	374728214	820pF±5%,50V,Plastic <W>
C132	354742209	22μF,16V,Elect.
C152	374724724	4700pF±5%,50V,Plastic
C153	354744709	47μF,16V,Elect.
C154	354780109	1μF,50V,Elect.
C176	354721019	100μF,6.3V,Elect.
C178	354741019	100μF,16V,Elect.
C179	374723334	0.033μF±5%,50V,Plastic
C180	354780229	2.2μF,50V,Elect.
C181	374722234	0.022μF±5%,50V,Plastic
C182	354782299	0.22μF,50V,Elect.
C201,C202	354780109	1μF,50V,Elect.
C203	354784799	0.47μF,50V,Elect.
C204	354780229	2.2μF,50V,Elect.
C205,C206	374723334	0.033μF±5%,50V,Plastic <D>
C209,C210	354741009	10μF,16V,Elect.
C211,C212	374721024	1000pF±5%,50V,Plastic <D>
C213,C214	354741009	10μF,16V,Elect.
C215,C216	374721824	1800pF±5%,50V,Plastic <P/A>
	374722224	2200pF±5%,50V,Plastic <W>
C301,C302	354780229	2.2μF,50V,Elect.
C307,C308	354721019	100μF,6.3V,Elect.
C309,C310	374726224	6200pF±5%,50V,Plastic
C311,C312	374721824	1800pF±5%,50V,Plastic
C313,C314	354780229	2.2μF,50V,Elect.
C315,C316	354741019	100μF,16V,Elect.
C501,C502	354761009	10μF,35V,Elect.
C505,C506	354741019	100μF,16V,Elect.
C507,C508	374723334	0.033μF±5%,50V,Plastic
C515,C516	354780229	2.2μF,50V,Elect.
C517	354761009	10μF,35V,Elect.
C525~C528	354761009	10μF,35V,Elect.
C551,C552	374724734	0.047μF±5%,50V,Plastic

CIRCUIT NO.	PART NO.	DESCRIPTION
	Capacitors	
C554	354780479	4.7 μ F,50V,Elect.
C555	354722219	220 μ F,6.3V,Elect.
C905,C906	3504207	6800 μ F,50V,Elect.
C907,C908	354742219	220 μ F,16V,Elect.
C910	354783309	33 μ F,50V,Elect.
C911	354752229	2200 μ F,25V,Elect.
C913~C915	354761009	10 μ F,35V,Elect.
C917,C918	354761009	10 μ F,35V,Elect.
C919	354780479	4.7 μ F,50V,Elect.
	Resistors	
R101	5210261	N06HR5KBC, Trim
R501,R502	5210260	N06HR3KBC, Trim
R513,R514	453530104	1 ohm±5%,1/2W,Metal <D>
R526,R527	443521004	10 ohm,1/2W,Metal oxide film
R531,R532	4000131	RGC22-0.22,Metal plate
R559,R560	453530824	8.2 ohm±5%,1/2W,Metal
R902,R903	441729114	910 ohm±5%,2W,Metal
R904	453530104	1 ohm±5%,1/2W,Metal
R905	441723904	39 ohm±5%,2W,Metal
R906	443521004	10 ohm,1/2W,Metal oxide film
	Terminals	
P001	25060157	NTM-4PDML083,Antenna <D>
	25060117	NTM-2PDML051,Antenna <P/W/A>
P301,P302	25045300	NPJ-6PDBL159, Input/Output
P303	25045172	HSJ1003-01-020, RI
P551	25060158	NTM-8PDML084,Speaker
	Relay	
RL551	25065485	NRL-2P5A-DC24-086
	Sockets	
JL102a	25050699	NSCT-21P503
JL501a,JL901a	25051112	NSCT-8P899
JL902a	25051087	NSCT-3P874
	Plugs	
	25055495	NPLG-2P470
P101	25055038	NPLG-2P29
P501,P502	25055038	NPLG-2P29
P301b	25055624	NPLG-3P586
P303b	25050627	NPLG-6P589

HEADPHONE TERMINAL PC BOARD (NASW-5434-1/1A)

CIRCUIT NO.	PART NO.	DESCRIPTION
S601	25035517	NPS-222-L479,Push switch
P601	25045255	YKB21-5009,Headphone terminal

SECONDARY TERMINAL PC BOARD (NAETC-5435-1/1A)

CIRCUIT NO.	PART NO.	DESCRIPTION
JL901b	25051112	NSCT-8P899, Socket

DISPLAY CIRCUIT PC BOARD (NADIS-5437-1/1A/1B/1C)

CIRCUIT NO.	PART NO.	DESCRIPTION
	Remote control sensor	
U701	24130010	HC-312
	ICs	
Q701	22240892	μ PD78044AGF-111
Q751	22240679	μ PC1346CS <P>
	FL tube	
Q702	212142Y	FIP13PM8
	Transistors	
Q703	221282 or	DTC144ES or
	2213560	RN1204
Q704	2213510 or	DTA114ES or
	2214350	RN2202
Q705~Q707	2213284 or	2SC1740S-R or
	2212115	2SC2458-GR
	Diodes	
D701~D704	223163 or	1SS133 or
D706,D707	223205	1SS270A
D705	224470562	MTZJ5.6B
D708	225142	SEL2913K,LED
D751	223163 or	1SS133 or
	223205	1SS270A <P>
	Resonators	
X701	3010163	CST4.19MGW,Ceramic
X751	3010203	AF6146CG, Crystal <P>
	Coil	
L701	233454K220	NCH-1452 220K
	Capacitors	
C701	3000076 or	0.1F,5.5V or
	3000078	0.1F,5.5V,Super
C702	375524744	0.47 μ F±5%,50V,Plastic
C703,C706	354721019	100 μ F,6.3V,Elect.
C704	353780109	1 μ F,50V,Elect.
C709	354721019	100 μ F,6.3V,Elect.
C753,C759	374724724	4700 pF±5%,50V,Plastic <P>
C754	374722234	0.022 μ F±5%,50V,Plastic <P>
C755	374724734	0.047 μ F±5%,50V,Plastic <P>
C756	353780229	2.2 μ F,50V,Elect. <P>
C757,C758	374723324	3300 pF±5%,50V,Plastic <P>
C761	354721019	100 μ F,6.3V,Elect. <P>
	Resistor	
R781	5210296	N06HR47KBE, Trim <P>
	Switches	
S702,S703	25035652	NPS-111-S604
S704	25035652	NPS-111-S604 <P>
S705~S727	25035652	NPS-111-S604
S728	25065286	NSS22112 <W>
	Sockets	
JL102b	25050927	NSCT-21P714
JL103a	25051088	NSCT-4P785
JL105a	25051087	NSCT-3P874
	Plug	
TP701	25055689	NPLG-2P645 <P>
	Holders	
	27190810	FL
	27190811	LED

VOLUME CIRCUIT PC BOARD (NAAF-5438-1)

CIRCUIT NO.	PART NO.	DESCRIPTION
Q451	22240322	LB1639,IC
C453,C454	374724734	0.047 μ F±5%,50V,Plastic capacitor
C473	354741019	100 μ F,16V,Elect. capacitor
R459,R460	5104335Y	N16RGM100KBTP25F,Volume, variable resistor
S451	25035609	NPS-122-L571,Loudness switch
JL301a,JL302a	25051087	NSCT-3P874,Socket
JL103b	25055625	NPLG-4P587,Plug
JL454a	25051088	NSCT-4P875,Socket

TONE CONTROL CIRCUIT PC BOARD (NAAF-5439-1/1A)

CIRCUIT NO.	PART NO.	DESCRIPTION
	ICs	
Q401,Q402	22240293	NJM4558L-D
	Capacitors	
C401,C402	354761009	10 μ F,35V,Elect.
C407,C408	354761009	10 μ F,35V,Elect.
C409,C410	374722234	0.022 μ F±5%,50V,Plastic
C411,C412	354780339	3.3 μ F,50V,Elect.
C413,C414	374722234	0.022 μ F±5%,50V,Plastic
C417,C418	354741019	100 μ F,16V,Elect.
	Resistors	
R405,R406	5104225	N11RGLC250KWT22Z, Balance,variable
R417,R418	5104230	N14RLC100KWT22Z,Treble,variable
R421,R422	5104230	N14RLC100KWT22Z,Bass,variable
	Holders	
JL302b	25051087	NSCT-3P874
JL303a	25051090	NSCT-6P877

POWER SUPPLY PC BOARD (NAPS-5440-1/1A/1B/1C)

CIRCUIT NO.	PART NO.	DESCRIPTION
C901,C920	3500191	⚠ DE7150F103MAC400V/125V, Capacitor IS
C901a	27301216	⚠ SB-1925A, Cover, capacitor <P/W/A>
R901	431523355	⚠ 3.3 Mohm,1/2W,Solid resistor <D>
S901	25035550	⚠ NPS-111-L512P,Power switch
F901	252163Y	⚠ 4A-UL/T-237,Primary fuse <D/W>
F901a	25050065	⚠ YSH403T,Fuseholders <D/W>
F902	252073	⚠ 1.6A-SE-EAK,Primary fuse <P/W/A>
F902a	25050065	⚠ YSH403T,Fuseholders <P/W/A>
P901	25055675	NPLG-2P631, Plug
RL901	25065483	⚠ NRL-1P5ADC12-84,Relay
JL902b	25055624	NPLG-3P586, Plug

AC OUTLET PC BOARD (NAETC-5442-1)
(120 V model only)

CIRCUIT NO.	PART NO.	DESCRIPTION
P951	25050409	⚠ NSCT-4P234,AC outlet

AC OUTLET PC BOARD (NAETC-5443-1/1A)
(230 V and Wolrdwide models only)

CIRCUIT NO.	PART NO.	DESCRIPTION
P952	25050410	⚠ NSCT-2P235,AC outlet
F951	252073	⚠ 1.6A-SE-EAK,Fuse <P>
F903a	25050065	⚠ YSH-403T,Fuseholders <P>

VOLTAGE SELECTOR SWITCH PC BOARD (NASW-5444-1)
(Wolrdwide models only)

CIRCUIT NO.	PART NO.	DESCRIPTION
S902	25065437	⚠ NSS-22157, Slide switch

POWER SWITCH PC BOARD (NAETC-5445-1)

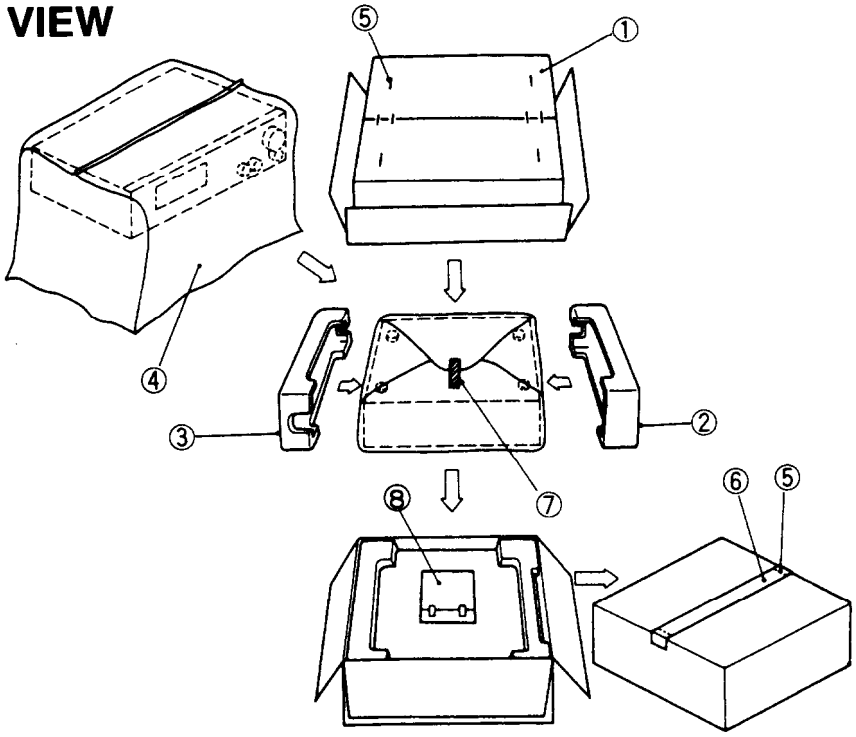
CIRCUIT NO.	PART NO.	DESCRIPTION
S701	25035652	⚠ NPS-111-S604,Power switch
JL105b	25051087	NSCT-3P874, Holder

NOTE: <D>: 120V model only
<P>: 230V model only
<W>: Worldwide model only
<A>: Australian model only

CAUTION:Replacement for transistor of mark *,if necessary, must be made from the same beta group (H FE) as the original type.

NOTE: THE COMPONENTS IDENTIFIED BY MARK ⚠ ARE CRITICAL FOR RISK OF FIRE AND ELECTRIC SHOCK. REPLACE ONLY WITH PART NUMBER SPECIFIED.

PACKING VIEW



REF.NO.	PART NO.	DESCRIPTION
1	29100034-1Y	Styren bag for unit
2	29052884AY	Master carton box <B><D/W/A>
	29052885AY	Master carton box <P>
	29052886AY	Master carton box <S>
3	282301	Staple
4	29091441BY	Pad R
5	29091440BY	Pad L
6	261504	Adhesive tape
7	29110071	PP tape
8	Accessary bag ass'y	
	29342135Y	Instruction manual
	29342137Y	Instruction manual U6 <P>
	29342138Y	Instruction manual U3 <C/W>
	2010200	Connection cord RI
	3010054	UM-3,Two batteries
	24140296Y	RC-296S,Remote control transmitter
	232140	NMA-3057,AM loop antenna
	292111Y	FM antenna <D>
	292112Y	FM antenna <P/W/A>
	25065462Y	YAE21-0237, FM antenna adaptor <W/A>
	25055018	CV-K-1,Conversion plug <W>
	29365019B	Warranty card <N>
	29100097-1Y	Styren bag for accessary
	29360778	Label FLASH <N/C>
	29361866Y	Label UPC <N>
	29095745	Sheet U7 <P>

NOTE: <D>:120V model only
<P>:230V/240V models only
<W>:Worldwide model only
<N>:U.S.A. model only
<A>:Australian model only
<C>:Canadian model only
<B>: Black model only
<S>: Silver model only

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